

10. (Amended) An adsorbent comprising an adsorbent moiety formed by coating an adsorption basis with a first gel substance and a second gel substance moiety.

11. (Amended) An adsorbent according to claim 10, which is formed by seasoning either said adsorbent moiety or said second gel substance moiety.

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12. (Twice Amended) An adsorbent according to claim 10, wherein said adsorbent moiety comprises an adsorbent formed by coating an adsorption basis with a gel substance and subsequently subjecting the coated basis to a freezing treatment set forth in claim 1.

13. (Twice Amended) An agent for removing a harmful substance by adsorption, said agent comprises an adsorbent set forth in claim 1.

Please cancel claims 2, 3 and 20.

REMARKS

The Office Action dated July 3, 2002 has been carefully considered. Claims 1, 6, 8 and 10-13 have been amended. Claims 2, 3 and 20 have been cancelled. Claims 1 and 4-19 are in this application.

Claims 12 and 20 were objected to as being in improper form because a multiple dependent claim can not depend from a multiple dependent claim. Claim 12 was amended in a preliminary amendment filed with the application to cancel multiple dependencies. Claim 20 has been cancelled.

The previously-presented claims were rejected under 35 U.S.C. § 112 as indefinite in the phrase "gel-like." The term "gel-like" has been amended to the term "gel substance" in claims 1, 6, 8, 10 and 11. Claim 13 was rejected as indefinite in the use of the phrase "an agent for removal by adsorption of a harmful substance." Applicants have amended claim 13 to obviate the Examiner's rejection.

Claims 1-3 and 20 were rejected under 35 U.S.C. § 101 as having the same invention as claims 1 and 12 of U.S. Patent No. 6,299,867 ('867). Claims 2, 3 and 20 have been cancelled. With regard to claim 1, the present invention set forth in claim 1 relates to an adsorbent formed by coating an adsorption basis with a gel substance and subsequently subjecting the coated basis to a freezing treatment. Support for claim 1 is

found throughout the specification and in particular on page 9, at lines 2-5 and examples 1, 2, 7 and 8 of the present specification. In contrast, the invention set forth in claim 1 of the '867 patent relates to an adsorbent formed by coating an adsorption basis with a gel substance already containing a frost damage preventing substance and subsequently depriving the coated basis partly or wholly of said frost damage preventing substance wherein said frost damage preventing substance is glycerin. Support for claim 1 of the '867 patent is found throughout the specification and in particular on page 14, at lines 9-13 and examples 3, 5, 9 and 11 of the present specification. Accordingly, the adsorbent of the present invention is produced by a different process than the adsorbent of the '867 patent and is a different invention. Withdrawal of this rejection is respectfully requested.

Claims 1, 4, 8, 9 and 18 were rejected under 35 U.S.C. § 103 as obvious in view of JP 61-216044 to Hara in view of JP 61-48615 to Ochi. Applicants submit that the teachings of these references do not disclose or suggest the invention defined by the present claims.

The present invention relates to an adsorbent formed by coating an adsorption basis with a gel substance and subsequently subjecting the coated basis to a freezing treatment. As described in the Background Art in the present specification, active carbon is used as an adsorption basis because of its large specific surface area and great ability to effect adsorption and is therefore utilizable as a representative adsorbent in various applications (see lines 13-15, page 1 of the specification). However, as stated at line page 1, line 16 through page, 2, line 7 of the specification, when the active carbon is directly ingested into the digestive system for the purpose of removing a harmful substance, it is liable to do harm by causing constipation. When an effort is made to mingle the active carbon with a foodstuff and ingest the mixture into the digestive system, it is at a disadvantage in imparting an unpleasant sensation to the palate and smearing the foodstuff in a blackish tint. It is also known that in the animal cell, the active carbon in a finely divided state is adsorbed on the protein or sugar protein in the outer layer of the cell membrane. When the active carbon in the finely divided state is directly ingested into the digestive system as an agent for the removal of a harmful substance by adsorption, it is suspected that part thereof persists in a state adsorbed on the cells in the

digestive system with fastness such that thorough elimination thereof from the digestive system may be extremely difficult.

Although adsorbents formed by coating active carbon with water-insoluble mannan, and the like have been proposed with a view to solving this problem, since these adsorbents result from forming a surface coat on the particles of active carbon, they suffer from such problems as inducing a decrease in the surface area and impeding ample manifestation of the ability of adsorption inherent in the active carbon (see page 2, lines 8-16).

Hara describes a hydrophobic konjak gel and a method for production of a formed hydrophobic gel substance which can be used for various purposes. As noted by the Examiner, Hara is silent to the teaching of a konjak gel coating on an adsorbent material. However, Hara teaches that the konjak gel can be made in a sheet and used as an adsorbent film.

In contrast to the invention defined by the present claims, Hara does not teach or suggest an adsorbent formed by coating an adsorption basis with a gel substance and subsequently subjecting the coated basis to a freezing treatment. Rather, Hara teaches a gel substance such as konjak which by itself does not possess the ability to effect adsorption. As noted by the Examiner, there is no teaching or suggestion in Hara of coating an adsorption basis with a gel substance and subsequently subjecting the coated basis to a freezing treatment.

Ochi describes an obesity preventive comprising an adsorbent. Ochi discloses an adsorbent comprising an adsorbent particle such as active carbon covered with a protective film on the surface thereof, wherein the protective film is formed of micropores. However, Ochi does not disclose concretely either from what material the protective film is made, nor how micropores are made to form the in the protection film.

Applicants note that in the present invention, by coating an adsorption basis with a gel-like substance and then subjecting the coated basis to a freezing treatment, the adsorbent of the present invention is enabled to keep intact the ability to effect adsorption possessed inherently by the adsorption basis because the moisture in the gel substance forming the coat is coagulated and is consequently allowed to form in the coat such

minute pores as have a larger diameter than the pores which would be formed solely by cross-linkage, as described at page 6, lines 12-21 of the specification. As shown from the results of the test for evaluation of speed of adsorption, the speed of adsorption of the adsorbent in control 1 which was obtained only by coating active carbon with konjak is unduly slower than that of the simple substance of active carbon. In contrast, the speed of adsorption of the adsorbent in examples of the present invention (see example 1) keeps intact that of the simple substance of active carbon. Accordingly, the adsorbent of the present invention has advantages which are not disclosed or suggested in Ochi.

Accordingly, the invention defined by the present claims is not obvious in view of Hara alone or in combination with Ochi.

Claims 5-7 and 10-17 were rejected under 35 U.S.C. § 103 as obvious in view of Hara and Ochi in combination with WO 93/12877 to Unger et al. and U.S. Patent No. 5,972,427 to Muhlfeld et al.

Unger et al. describe a porous body for an industrial application such as an adsorbent in a fluid stream. The porous bodies can be placed in a vessel having an inlet and outlet. The bodies can also be used in reactors, fixed bed reactors or fluidized bed reactors (see page 28, line 34 - page 29, line 11).

In contrast to the invention defined by the present claims, Unger et al. do not teach or suggest an adsorbent formed by coating an adsorption basis with a gel substance and subsequently subjecting the coated basis to a freezing treatment. Further, as noted by the Examiner, Unger et al. do not teach or suggest that the adsorption basis is carbon, as defined in claim 5. Accordingly, Unger et al. do not cure the deficiencies of Hara and Ochi noted above.

Muhlfeld et al. disclose an adsorbent filter fabric comprising a textile carrier having adsorbent particles fixed on it by thermoplastic binding. The adsorbent particles can be coated with a binding agent. Activated carbon can be used as the adsorbent. The fabric is used in air purification systems, as well as protective clothing.

In contrast to the invention defined by the present claims, Muhlfeld et al. do not teach or suggest an adsorbent formed by coating an adsorption basis with a gel substance

and subsequently subjecting the coated basis to a freezing treatment. Thus, Muhlfeld et al. do not cure the deficiencies of Hara and Ochi noted above.

Furthermore, Unger et al. and Muhlfeld et al. do not teach or suggest seasoning either a first or second gel substance, as defined in claim 11. In addition, Unger et al. and Muhlfeld et al. do not teach or suggest an agent for removal of a harmful substance in which the harmful substance is a food additive, a feed additive, an agricultural pesticide, a food poisoning substance, allergen, a heavy metal, or a strongly poisonous organic compound, as defined in claim 14. Also, Unger et al. and Muhlfeld et al. do not disclose or suggest the substances defined in claims 15-17 or adsorption in the digestive system, as defined in claims 18 and 19.

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Applicants note that when the adsorbent of the present invention uses minute particles of powdered active carbon, for example, as the adsorption basis, it assumes the constitution of a dispersion system having the adsorption basis uniformly dispersed in the gel substance. The adsorbent, therefore, permits highly efficient removal by adsorption of a harmful substance because active carbon is put in a highly dispersed state and the adsorbent in its entirety enjoys an increase in the surface area available for adsorption and a consequent increase in the ability of effect adsorption as compared with the adsorbent produced by solely using active carbon (see page 7, lines 4-14).

Since the adsorbent of the present invention has the adsorption basis coated with the gel substance, it can be directly ingested into the digestive system and utilized therein for effecting ready removal by adsorption of a harmful substance which has mingled in a foodstuff and consequently succumbed to assimilation therein.

Applicants note that since the adsorbent of the present invention has the adsorption basis coated with the gel substance, it can be directly ingested into the digestive system and utilized therein for effecting ready removal by adsorption of a harmful substance which has mingled in a foodstuff and consequently succumbed to assimilation therein. The adsorbent, on being directly ingested into the digestive system, does not induce such adverse effects as constipation. In contrast, Hara, Ochi, Unger et al. or Muhlfeld et al. do not disclose or suggest coating the adsorbent and subjecting the coated basis to freezing treatment such that the adsorbent would not be readily discharged

from the digestive system. In the present invention, the adsorbent which has effected the removal by adsorption of a harmful substance in the digestive system can be very quickly and easily discharged from the digestive system.

Further, the adsorbent of the present invention is only required to mingle into or contact a foodstuff to implement the removal by adsorption of the harmful substance contained in the foodstuff. In this case, the adsorbent which has effected the removal of the harmful substance by adsorption can be separated easily and quickly from the foodstuff as compared with the adsorbent which is used all by itself as disclosed in Inoue et al. Further, in the present invention, even when the adsorbent escapes the separation and entrains the foodstuff and succumbs to assimilation in the digestive system, it warrants safety because it can be quickly discharged from the digestive system as mentioned above. When the adsorbent of the present invention is mixed with the processed foodstuff and the resultant mixture is put to use for eating, it produces no sensation of the presence of foreign particles, excels in palatability, and avoids polluting the food material in a black tint, as described in page 6, line 22 through page 7, line 3. Accordingly, the adsorbent of the present invention has advantages which are not disclosed or suggested in Hara, Ochi, Unger et al. or Muhlfeld et al.

In addition, there is no motivation to one skilled in the art to combine Hara directed to hydrophobic gel, Ochi directed to an absorbent for an obesity preventative with Unger et al. directed to an absorbent for fluids in an industrial device or Muhlfeld et al. directed to a fabric for a purification system or clothing. Applicants submit that there must be some suggestion to combine the references. Furthermore, even if the references were combined the references would not teach the present invention since none of the references teach an absorbent formed of a gel substrate subjected to freezing treatment. Moreover, a person of ordinary skill in the art using the teachings of Hara, Ochi, Unger et al. and Muhlfeld et al. would not conceive the construction of the present invention and the peculiar effects of the present invention mentioned above which are accomplished by the construction of the absorbent.

In view of the foregoing, Applicants submit that all pending claims are in condition for allowance and request that all claims be allowed. The Examiner is invited

to contact the undersigned should she believe that this would expedite prosecution of this application. It is believed that no fee is required. The Commissioner is authorized to charge any deficiency or credit any overpayment to Deposit Account No. 13-2165.

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES

1. (Amended) An adsorbent formed by coating an adsorption basis with a gel[-like] substance and subsequently subjecting the coated basis to a freezing treatment.

6. (Twice Amended) An adsorbent according to claim 1, wherein said gel[-like] substance is the divalent metallic salt of a macromolecular polycarboxylic acid.

8. (Twice Amended) An adsorbent according to claim 1, wherein said gel[-like] substance is soybean curd, jelly, konjak, agar, perilla, gelidium jelly, or chitosanoxalic acid salt gel.

10. (Amended) An adsorbent comprising an adsorbent moiety formed by coating an adsorption basis with a first gel[-like] substance and a second gel[-like] substance moiety.

11. (Amended) An adsorbent according to claim 10, which is formed by seasoning either said adsorbent moiety or said second gel[-like] substance moiety.

12. (Twice Amended) An adsorbent according to claim 10, wherein said adsorbent moiety comprises an adsorbent formed by coating an adsorption basis with a gel substance and subsequently subjecting the coated basis to a freezing treatment set forth in claim 1.

13. (Twice Amended) An agent for [removal by adsorption of] removing a harmful substance by adsorption, [which] said agent comprises an adsorbent set forth in claim 1.